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5 **TITLE**

Methods and envelopes for rational sealing of documents and inserts of different kinds in envelopes.

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Background Art

This invention covers a field where putting documents into envelopes normally is carried out with the use of envelopes or elements for envelopes manufactured with various conventional sealing techniques but where the final sealing according to this patent application is performed by an embossing technique.

Ordinary envelopes are sealed with a paper flap with a string of glue fastening to the outer side of the envelope. The glue can be either water-soluble glue or any other glue as heat or pressure sensitive or self-adhesive. The heat in a laser printer affects this later category of glues and it is due to this unsuitable to add addresses etc. to these envelopes by printing in a printer. Instead window envelopes are commonly used where the address is incorporated at the enclosed document or the address is attached to the outside of an ordinary envelope as an address label. Window envelopes are more expensive and the address labels implies the use of special equipment or manual handle with accompanying risks of handling faults.

Mail inserting machines folding and gluing envelopes with water-based glue are frequently existing but the use of water makes the machines complicated and requires maintenance and cleaning in order to give a reliable operation.

Known machinery is mechanically complicated. There are problems to lift the envelope flap, moisten the glue strip and then fold the flap back. The envelope flap shall shut and seal the envelope. The machinery handling time with the flap and the gluing procedure takes some time and is limiting the mail inserting speed.

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5 **Outline of the Invention**

Embossing as a technique to join two papers is a known technique, which is simple, fast and requires no additives.

10 In patent applications SE 9803525-6, SE 0004205-1, SE 0103145-9 and PCT/SE01/02537 is described how the technique can be used in order to, in one operation, create an envelope by using embossing technique to seal the outer side and enclosed documents, if any, solely by the use of plain paper sheets as starting material.

15 This patent application deals with how embossing technique can be applied to prefabricated envelopes or material for envelopes in order to obtain a simpler and flexible sealing operation without any additives. The simplification is predicted to gain great influence to envelope sealing by machinery. The envelopes and methods according to this patent application can be used, with advantage, instead of the plane paper envelopes
20 described in the patent applications mentioned above.

The mechanical design of the machines for the plurality of the patent claims of this patent application will be simple, since the sealing of these envelopes is a one-directional operation instead of a two-directional.

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Also high speed, high volume industrial inserting machines may take advantage of the simple technique, which is both fast and reliable. A module of the sealing mechanism can with advantage be incorporated in to-days large inserting machines.

30 In this patent application is also dealt with how the sealing technique can be used to stick together documents which not necessarily must be entirely sealed, as e.g. mailshots. Furthermore is shown how credit cards, CD-ROM: s and other similar dispatches can be fixed inside the envelope or on inserts.

35 Finally is shown a process to make an envelope secrecy-safe in such a way that if the envelope is opened it will torn. (Normally glue sealed envelopes can be opened and resealed without it can be detected.)

5 **Technical Field**

There are patent applications describing procedures to manufacture envelopes in the same operation as the documents are printed. The procedure is described in the patent applications mentioned above and is called embossing. Only plain paper sheets are used
10 and the process is well suited for use in office (business) machines but also for industrial applications.

Envelopes sealed according to this patent application are preferably intended to be used with mail inserting machines but can also be used with office machines or at hand-
15 operated embossing in the same way as is shown in patent application SE 0103145-9.

Sealing by means of embossing is applicable and usable as well with other processes and basic material for the envelopes than stated in the patent applications mentioned above. When embossing is stated in "Disclosure of Invention" below, the embossing can be
20 continuous or split up into sections with space in-between or consist of limited areas. It is made with embossing wheels or tools for punching. The embossing can be performed in one or several rows /fields.

In "Disclosure of Invention" below different designs is shown with reference to the
25 various drawings.

5 **Disclosure of Invention**

1. Envelope without flap or material for envelope without flap.

Figure 1 shows an envelope of this design where (1) is the envelope itself, (2) indicates
10 notches in one or both paper sides of the envelope, (3) shows the final sealing embossing,
(4) the sealed side edges, (5) the sealed bottom edge and (6) the enclosed document.

The sealed side edges (4) may be sealed by embossing or by glue and the sealed bottom
15 edge may preferably have been produced by folding the paper constituting the envelope
or by gluing or embossing of the bottom edge.

The notches (2) in the upper paper sides are meant for facilitating opening of the
envelope as well at the insert procedure in the mail inserter as at opening of the sealed
20 envelope.

The sealing of the envelope (3) takes place as the last phase according to the principles
shown in the patent applications referred to above.

The envelope may be run through a printer if desired. It may be fitted with window. The
25 open edge is embossed after insert of the content. Only one edge needs to be embossed,
an operation, which preferably is performed when the mail leaves the machine. The
process is fast and the seal has its full strength immediately after the sealing.

Neither glue, liquid nor heat needs to be added, something that otherwise is quite
30 common.

It is simple to adapt the process to different envelope sizes as embossing is performed at
one edge only. The notches may be one or several and are placed both at the front and at
the back, they are not overlapping each other and their appearance may be varying, for
35 example they may consist of holes or merely by cuts in the paper. The embossing joint,
which is strong, is easy to open by slitting open with a paperknife from these notches.

5 **1a. Envelope with flap or material for envelope with flap**

Figure 2a shows this type of envelope where (7) is the envelope manufactured in a conventional manner or by basic material as that under 1 above. The flap (8) is folded over the back and (9) indicates the upper edge of the back, which should extend as high up towards the folding as possible.

Figure 2b shows the envelope after the sealing procedure by means of embossing (3) and with an enclosed document (6).

15 The only difference when compared with a conventional envelope is that the flap is sealed through embossing after the letter is inserted. The embossing thus joins three layers of paper namely the flap, the back and the front of the envelope.

The back of the envelope ought to extend as close as possible towards the folding of the flap so that the embossing seal can be placed close to the edge of the envelope in order not to limit the space for the content of the envelope.

The edge of this type of envelope is stronger then that of an envelope manufactured according to 1 above.

Notches, as described in 1 above, may also be applied.

2. Envelope in the shape of " A Flattened Endless Paper Tube "

Figure 3a shows the manufacture of envelopes deriving from material in the shape of a paper tube. The material consists of a flattened tube of paper (9) that during the production is moved in direction (10). The material is at the following working operation cut off at (11) and the flattened tube thus opens there.

At the manufacturing of the envelope (12) the tube is sealed by embossing at (13) then the tube is cut at (14).

5 The final envelope is shown in figure 3b after mail insert and sealing where the embossing (15) is the embossing in the previous operation stage – (13) in figure 3a – and (16) is the final sealing after the insert of the content (6).

The material for the envelopes can be available as flattened tube of standard length or on
10 rolls. The material may even have windows when manufacturing window envelopes.

The dimensions (B) and (L) shown in figure 3a represent the width respectively the length of the manufactured envelopes. By choosing different lengths (L) one can manufacture different envelope sizes with one and the same width (B). Using one width
15 enables manufacturing of e.g. the standard letter sizes C4, C5 and C65.

Printing on the envelope or the material for the envelope may be performed and only one embossing direction is used. The process in the inserting machine may be worked out in different ways.

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Different methods to produce envelope material are shown in figures 4a, 4b and 4c. The paper may be taken from rolls, as in to-days envelope-producing machines or it may consist of plane paper sheets.

25 In figure 4a is shown the production of “ tubes “ manufactured of plain paper of desired size by embossing (17) along two edges.

Figure 4b shows a tube produced from a length of paper by folding and sealing the overlapping by embossing or gluing (18).

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Figure 4c shows how folding a length of paper and sealing it along a long side (19) by embossing or gluing may produce a tube.

5 Delimitation of space in envelopes.

If an envelope shall contain documents as well as other details as e.g. credit cards, CD-ROMs or similar details, it is possible to secure the detail to the intended place in the envelope by embossing.

10 Figure 5a shows an envelope (20) with some sort of plastic card (21) enclosed where the card is secured with the two rows of embossing (22). The envelope is then in normal way sealed by embossing (3).

15 Figure 5b shows an envelope (20) where part of the inside space is reserved for a document (23) and one part of the space has been reserved for a plastic card or other detail (21) and where the positioning of the details has been done by embossing (22). The envelope is then in normal way sealed by embossing (3).

20 Figure 5c finally shows an envelope (20) with an insert of a CD-ROM (33) where the position of the CD-ROM is secured by the embossing (22) and then is sealed by embossing (3).

Besides equipping the envelope with partitions the inserts may in a corresponding way be fastened to a folded paper that is inserted into an envelope which is then sealed.

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This technique for delimitation of space or fastening may be used on any type of paper envelope, not just these described in this patent application.

30 3. A non-sealed envelope.

Less important messages –e.g. leaflets – need necessarily not be sent in sealed envelopes. The figures 6a-6c show some variants.

35 Figure 6a shows a document where the information is found at the inner side of the wrapping and where the sealing is performed only at one edge (24).

Figure 6b shows a design where the consignment (25) also contains a folded document

5 (26) which is fixed at the sealing operation by embossing (24).

Figure 6c finally shows how several documents (27) in the same way are fixed to the wrapping (25) at the sealing (24).

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5. Batch of documents or leaflets.

Figure 7 shows a procedure that with advantage may be used to stick together a number of papers as e.g. leaflets or similar documents.

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The papers / documents (28) may be of varying sizes and are stuck together by embossing preferably along a longer side (29).

20 4. Secrecy guarded envelope.

Ordinary conventionally manufactured envelopes, where gluing has been used for sealing, are fairly simple to open and then reseal without necessarily anybody noticing it. By providing an envelope with embossing joints – partly or all over – it will be obvious if
25 the envelope has been opened.

In figure 8 is shown how the glued edges (30) of the envelope has been reinforced in the glue sealing by embossing (31) as well as the glued sealing of the envelope has been reinforced by embossing (32). The enclosed consignment is shown as (6).